Look me in the face and tell me that I needed to be transferred: Defining the criteria for transferring patients with isolated facial injuries

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OBJECTIVES: Despite the known burden of inappropriate overtriage of patients with facial injuries on the health care system, no comprehensive guidelines for the transfer of these patients exist. The aim of this study was to define guidelines regarding which patients with isolated craniomaxillofacial trauma require transfer to higher levels of care.

METHODS: We performed a 5-year review at a Level I trauma center (2017–2021). We included all transferred patients with isolated facial fractures. Patients were stratified into appropriate (those who received any emergency [taken directly to operating room] or urgent intervention [intervention in same admission] for facial injuries or were admitted to the ward for observation) and potentially inappropriate (patients who did not require any emergent or urgent intervention or admission to the facial trauma service [FTS]) transfers. Three independent experts reviewed the reason for the transfer and required interventions during the hospitalization and defined if the transfer was appropriate.

RESULTS: We identified 511 patients transferred to our Level I trauma center with isolated facial injuries. Over half (n = 259, 51%) of these transfers were potentially unnecessary, as these patients did not require intervention or admission. Overall, FTS was consulted for 89% of patients. A total of 252 patients (49%) were identified as appropriate transfers, of which 54% were admitted to the floor, 15% received emergency intervention, and 79% underwent urgent intervention. Eighty-two percent of potentially inappropriate transfers received an FTS consultation, and 81% were discharged from ED with a median length of stay of 6 hours. After a review of patient's hospitalization events, the Facial Injury Guidelines were defined.

CONCLUSION: More than half of the patients with isolated facial fractures did not require any intervention or admission. The proposed guidelines could significantly reduce unnecessary transfers and health care costs for patients with isolated craniomaxillofacial trauma. Prospective validation of the Facial Injury Guidelines is warranted before it could be considered for implementation. (*J Trauma Acute Care Surg.* 2025;00: 00–00. Copyright © 2025 Wolters Kluwer Health, Inc. All rights reserved.)

LEVEL OF EVIDENCE: Therapeutic/Care Management; Level III.

KEY WORDS: Isolated facial trauma; Facial Injury Guidelines; craniomaxillofacial trauma.

Facial trauma remains a significant public health concern with profound physical and psychological impacts.[1] Facial fractures are relatively common, especially in polytrauma patients, with a reported prevalence ranging from 20% to 60%.[2] Beyond the immediate medical challenges, facial injuries carry major socioeconomic consequences, including the substantial costs of hospitalization and treatment, as well as the loss of income for affected individuals.

Patients with facial trauma are frequently referred to higher-level trauma centers as a result of limited availability of specialists and facilities equipped to manage their injuries.[3] Although studies show that patients with severe trauma experience better outcomes when treated at Level I trauma centers, the necessity of such transfers in the case of facial trauma is unclear.[4,5] Despite research showing that facial trauma patients are among the most likely to be discharged without requiring any procedures, standardized guidelines addressing the appropriateness of facial trauma transfers remain limited,[6] leading to significant variability in transfer decisions.

The primary objective of this study is to develop the Facial Injury Guidelines (FIG), an evidence-based algorithm to standardize interfacility transfers for facial trauma. We aim to assess the appropriateness of transfers by determining the proportion of patients who required admission, urgent/emergent intervention, or specialty consultation. We hypothesize that a significant proportion of transferred patients with isolated facial trauma are inappropriately transferred, leading to unnecessary resource utilization.

PATIENTS AND METHODS

Study Design and Population

We performed a 5-year (2017–2021) retrospective analysis of prospectively maintained database of patients with isolated

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craniomaxillofacial trauma transferred to our Level I adult trauma center. This study was approved by the institutional review board of our institution. We adhered to the STrengthening the Reporting of OBservational studies in Epidemiology guidelines (see Supplemental Digital Content, Supplementary Data 1, http://links.lww.com/TA/E453).

Inclusion and Exclusion Criteria

We included all adult (18 years or older) trauma patients who were transferred to our facility primarily for evaluation and/or management of isolated facial injuries, as documented in the referring facility's transfer notes and diagnosis records. Facial injuries were identified using *International Classification of Diseases, Tenth Revision*, diagnosis codes, encompassing single or multiple fractures of the skull, nasal bones, orbital floor, malar, maxillary, zygomatic, and mandibular bones. Soft tissue injuries were described as damage to the facial soft tissue.

To ensure that transfers were driven by facial trauma rather than other injuries, we conducted a secondary review of transfer justifications and excluded cases where nonfacial injuries were the primary reason for transfer (e.g., nonface Abbreviated Injury Scale score ≥3), regardless of the severity of the facial trauma. Patients who were not transferred from other facilities and patient-requested transfers for esthetic reasons were also excluded from our study.

Data Points

The following data points were recorded for our study: patient demographics, age, sex, presenting systolic blood pressure and heart rate, Injury Severity Score, and Face Abbreviated Injury Scale, emergency department (ED) discharge disposition, mode of transport, insurance type, and medical costs (overall hospital cost and reimbursements). We also recorded the information about injury type, number of injuries, procedures performed, consultation rate by the facial trauma service (FTS), and time in ED before discharge.

Development of the FIG

We developed the FIG based on existing literature and expert opinions regarding the appropriateness of patient transfer for specialty evaluation. Our expert panel included a plastic and reconstructive surgeon, a maxillofacial surgeon, and an ophthalmologist. Appropriateness of transfer was primarily based on prior literature on necessity of transfer for higher-level care evaluation.[7] Transfers were considered appropriate when patients with isolated facial injuries met one of the following criteria: (1) immediate transfer from ED to the operating room for emergency intervention, (2) underwent intervention during the same hospital admission (urgent intervention), or (3) admission to the floor for observation. Conversely, potentially inappropriate transfers were defined as cases where patients were evaluated but did not require admission, intervention, or immediate specialty care.

Agreement on appropriateness was established through interdisciplinary team meetings, requiring unanimous agreement among all three experts for a transfer to be considered appropriate. If two of three respondents agreed, transfers were considered appropriate only if alarming signs were present. Alarming signs for cases without expert agreement were determined based on previous literature[8,9] and the panel's clinical expertise. Transfers were automatically categorized as potentially inappropriate if fewer than two experts agreed.

For injury types without expert consensus on the appropriateness of transfer, the alarming signs were defined as patients who presented with decreased visual acuity and/or diplopia, restricted ocular motility, and retrobulbar hemorrhage for orbital fractures. In cases of complex zygomaticomaxillary fractures, decreased visual acuity and/or diplopia were identified as alarming signs. Alarming signs of mandibular injuries included bilateral mandibular and mandibular condyle neck fractures.

All facial injuries were classified based on their location into four groups: upper facial, middle facial, lower facial, and soft tissue injuries. (1) Upper facial bone included frontal sinus fractures; (2) middle facial bone fractures, which included injury of the orbital, zygomatic arch, nasal, and maxillary sinus bones; Le Fort fractures, including types I, II, and III; and complex fractures, which included zygomaticomaxillary fractures and naso-orbito-ethmoid fractures; (3) lower facial bone fractures, including hard palate fractures, maxillary alveolus fractures, and mandible fractures (which were subclassified as mandibular condyle fracture and bilateral mandibular fracture); and (4) soft tissue injuries, which included injuries greater than 2 cm of missing tissue, injuries with neurological signs and symptoms, and eyelid/globe lacerations.

Subanalysis of Insurance and Transfer Appropriateness

In addition to evaluating overall transfer appropriateness using FIG, we performed a subanalysis examining the role of insurance status in appropriateness of transfer. Insurance categories were classified as Medicaid, Medicare, other government-funded programs, private/commercial insurance, self-pay, workers' compensation, and other. Transfer appropriateness was assessed within each group using χ^2 analysis, comparing the proportion of appropriate versus potentially inappropriate transfers across insurance types.

Outcome Measures

The primary outcome of this study was the classification of transfers as appropriate or potentially inappropriate based on FIG criteria, allowing for an evaluation of transfer patterns and potential areas for triage improvement. Secondary outcome measures were frequency of injuries, FTS consultation, surgical procedures, ED lengths of stay, and the hospital costs associated with potentially inappropriate transfers.

Statistical Analysis

We performed descriptive statistics. Data were reported as means (SD) for continuous variables, as medians (interquartile range) for ordinal variables, and as proportions for categorical variables. To evaluate the association between insurance status and transfer appropriateness, we performed a χ^2 test for independence, comparing the proportion of appropriate versus potentially inappropriate transfers across different insurance categories. All statistical analyses were conducted using Statistical Package for Social Sciences, version 29 (IBM, Armonk, NY).

RESULTS

Following our secondary review of our selection process, we ensured that all included patients were transferred for facial trauma evaluation or management, with exclusions made for cases where nonfacial injuries independently justified transfer. Supplemental Digital Content (Supplementary Data 2, http://links.lww.com/TA/E454) depicts our patient flow diagram. We identified 511 patients transferred to our Level I trauma center with isolated facial injuries. Of these, 252 (49%) were classified as appropriate transfers, while 259 (51%) were potentially inappropriate transfers. The mean (SD) age of the overall population was 46 (24) years, and 67% were male. Most patients were referred from Level III trauma centers (34.6%), followed by Level II (28.7%) and Level IV centers (24.6%). Additionally, only 61 patients (11.9%) were transferred from outside EDs. The median (interquartile range) length of stay in the ED was 5 (3–7) hours. Of all patients, 38.7% were discharged from the ED to home, 26.8% were admitted to a floor, 10.5% were relocated to the ED's observation unit, and 3.1% were admitted to the intensive care unit. As for the transfer mode, 43.4% patients (222) arrived via ambulance; 41.9% (214) presented via private transport, public vehicle, or directly walked in the ED; 5.1% (26) were brought by the police department; and 8% (41) arrived via air ambulance. Further details, including baseline characteristics, ED discharge disposition, transport mode, insurance information, and hospital charges, are summarized in Table 1.

Fractures of the middle facial bones were the most common type of injury (68%), with orbital fractures being the most common subtype (49.9%), followed by nasal bone fractures (21.7%). Soft tissue injuries (34.8%) represented the second most common group, with most patients sustaining small (<2 cm) soft tissue injuries only. Lower facial bone injuries (29.9%) were the third most common group, and among these, mandible fractures (29.9%) were the most prevalent. Of all our patients, 47.7% sustained a single injury (e.g., isolated orbital, nasal, or mandible fractures), 31.3% presented with two injuries (e.g., zygomatic arch and maxillary or nasal bone and orbital fractures), 15.8% presented with three injuries (e.g., Le Fort I and mandible or combined zygomatic-maxillary and nasal fractures), and 5.2% presented with four or more injuries (e.g., Le Fort III, bilateral mandible and orbital fractures). Table 2 depicts the frequency of facial injuries and their subtypes, as well as the number of injuries sustained by patient. Regarding the treatment of these injuries, 46% of our patients required surgery (n = 239). The most common procedure performed was soft tissue laceration repairs (24.7%), followed by orbital fracture repair (14.2%), Le Fort repairs (12.6%), globe repairs (11.3%), and canalicular repairs (7.5%) (Table 3).

In Table 2, injuries and operative management are presented at the patient level, meaning each patient is counted once per injury type. However, given that some patients sustained multiple injuries, they may appear under multiple injury categories within the table. Conversely, Table 3 reflects individual surgical procedures performed, where a single patient may have undergone multiple interventions. As a result, the total number of procedures in Table 3 exceeds the number of surgical patients reported in Table 2. This distinction accounts for apparent numerical overlaps across tables, as some injuries required more than one type of surgical repair, and some patients required interventions for multiple injuries. This breakdown reinforces the need to analyze procedural frequency separately from patient-based injury data to accurately reflect the surgical burden.

Overall, 89% (n = 457) received consultation from FTS. Upon reviewing each admission and hospital course, 49% of transfers (n = 252) were identified as appropriate. Of these transfers, 54% were admitted to the floor, 79% underwent urgent operations, and 15.5% required emergent procedures. All patients in this group required FTS consultation, hospital admission, or a surgical procedure. Eighteen patients were admitted for

TABLE 1. Baseline Characteristics, Insurance, and Hospital Cost Information of the Study Population

Variables	Overall (n = 511)
Demographics	
Age, mean ± SD	46 ± 24
Male, n (%)	342 (67)
ED vital signs	
SBP, mean ± SD, mm Hg	139 ± 21
HR, mean ± SD, bpm	84 ± 18
Injury characteristics	
ISS, median (IQR)	5 (4–8)
Face-AIS, median (IQR)	2 (2–2)
Origin of transfer, n (%)	
Level II TCs	147 (28.7)
Level III TCs	177 (34.6)
Level IV TCs	126 (24.6)
Outside EDs (nontrauma hospitals/stand-alone emergency clinics)	61 (11.9)
ED discharge disposition, n (%)	
Floor bed (general admission, nonspecialty unit bed)	137 (26.8)
ICU	16 (3.1)
Observation unit*	54 (10.5)
Telemetry/step-down unit	6 (1.1)
Operating room	39 (7.6)
Home	198 (38.7)
Other**	61 (11.9)
ED length of stay, median (IQR), h	5 (3–7)
Transport mode, n (%)	
Ambulance	222 (43.4)
Helicopter ambulance	41 (8)
Police	26 (5.1)
Private/public vehicle/walk-in	214 (41.9)
Other	4 (0.8)
Total hospital charges, mean (SD), US $	32,205.23 (30,469.10)
Total reimbursement, mean (SD), US $	4,221.70 (6,862.40)

*Less than 24 hours.

**Left AMA, transferred to a mental health institution, hospice care, or a skilled nursing facility.

AIS, Abbreviated Injury Scale; AMA, against medical advice; GCS, Glasgow Coma Scale; HR, heart rate; ICU, intensive care unit; IQR, interquartile range; ISS, Injury Severity Score; SBP, systolic blood pressure; TC, trauma center.

TABLE 2. Injuries Based on Location and Number

Variables, n (%)	Overall (n = 511)	Operative Management (n = 239)
Upper facial bones		
Frontal sinus fracture	9 (1.8)	4 (1.6)
Middle facial bones	349 (68)	
Orbital fracture	255 (49.9)	111 (46.4)
Decreased visual acuity/diplopia	55 (10.8)	64 (26.7)
Restricted ocular motility	55 (10.8)	47 (19.6)
Retrobulbar hemorrhage	12 (2.3)	12 (5)
Comminuted fracture	20 (3.9)	20 (8.3)
Isolated fracture with no alarming sign	156 (30.5)	0 (0)
Zygomatic arch fracture	49 (9.6)	0 (0)
Nasal bone fracture	111 (21.7)	0 (0)
Maxillary sinus fracture	81 (15.9)	0 (0)
Complex fractures		
Zygomaticomaxillary fracture	19 (3.7)	6 (2.5)
Decreased visual acuity/diplopia	6 (1.2)	6 (2.5)
Naso-orbito-ethmoid fracture	8 (1.6)	8 (3.3)
Decreased visual acuity/diplopia	2 (0.4)	8 (3.3)
Le Fort fracture		
Type 1	15 (2.9)	0 (0)
Type II	27 (5.3)	27 (11.2)
Type III	9 (1.8)	9 (3.7)
Lower facial bones	153 (29.9)	
Hard palate fracture	9 (1.8)	0 (0)
Maxillary alveolus fracture	22 (4.3)	0 (0)
Mandible fracture	146 (28.6)	20 (8.3)
Mandibular condyle fracture	10 (1.9)	10 (4.2)
Bilateral mandibular fracture	14 (2.7)	10 (4.2)
Soft tissue injury	178 (34.8)	
>2 cm of missing tissue	12 (2.3)	12 (5)
Neurologic signs and symptoms*	10 (2)	10 (4.2)
Eyelid/globe laceration	40 (7.8)	40 (16.7)
No. injuries		
1 injury	244 (47.7)	80 (32.8)
2 injuries	160 (31.3)	90 (56.3)
3 injuries	81 (15.8)	55 (67.9)
≥4 injuries	26 (5.2)	24 (92.3)

*Facial nerve and mental nerve deficits.

TABLE 3. Procedure Type

Procedure Frequency, n (%)	Procedures (n = 239)
ORIF of frontal sinus, anterior table	4 (1.7)
Orbital fracture repair	34 (14.2)
Canthotomy	12 (5)
ORIF of midface	3 (1.3)
Naso-orbito-ethmoid repair	8 (3.3)
Le Fort repair	30 (12.6)
Maxillomandibular fixation	6 (2.5)
ORIF of mandible	14 (5.9)
Intermaxillary fixation of mandibular condyle	10 (4.2)
Laceration repair	59 (24.7)
Globe repair	27 (11.3)
Canalicular repair	18 (7.5)
Ear lobe laceration repair	3 (1.3)
Repair of tongue laceration	4 (1.7)
Repair of lip laceration	7 (2.9)

ORIF, open reduction, internal fixation.

observation, and five of these required unplanned interventions. Eighty-two percent of all potentially inappropriate (n = 249) transfers required consultation by the FTS, but most were discharged home from the ED without any intervention (81%). Among potentially inappropriate transfers, 26 (5.1%) underwent outpatient surgical intervention after discharge by FTS, including 15 Le Fort repairs, 2 mandibular surgeries, 2 maxillary alveolus repairs, 3 zygomatic arch repairs, and 4 nasal bone procedures. Notably, none of these patients experienced complications following their procedures. Table 4 stratifies transferred patients by appropriateness, detailing differences in hospital course.

In the subanalysis of patients based on insurance status, appropriate transfers had significantly higher rates of private insurance and self-pay ($p < 0.05$), whereas potentially inappropriate transfers were more frequently associated with Medicaid as the primary payment method. Table 5 outlines the insurance distribution among transferred patients.

Considering the previously stated criteria and the expert panel's evaluation of each hospitalization event, the FIG were developed (Figs. 1 and 2).

DISCUSSION

The current standard for transferring patients with facial injuries is influenced by provider, facility, and region. Our institution is the only American College of Surgeons–designated Level I trauma center in Southern Arizona. Experience from our faculty members has suggested that a substantial number of transferred patients with isolated, stable facial trauma do not require urgent intervention or hospitalization, potentially representing a burden to our system. In this study, we propose guidelines for the transfer of isolated facial injuries, developed using objective criteria and expert opinion on the necessity of such transfers. Based on our analysis, adherence to the proposed FIG during the study period could have prevented over half of the transfers to our hospital for these injuries. These guidelines provide a clear framework for decisions regarding the transfer of patients with isolated facial injuries to a higher care facility.

Frontal Sinus Fractures

As a result of its prominent location and extensive surface area relative to the rest of the facial skeleton, the frontal region is frequently the first to be impacted in both vehicular and assault injuries.[10] Majority of these injuries presented to our hospital with facial lacerations, and over half exhibited a visible depression, consistent with the typical injury pattern described in the literature.[11] Additionally, 22% of patients with frontal sinus fractures presented with cerebrospinal fluid rhinorrhea, a finding reported in up to one third of patients with these injuries.[12] Although the management of frontal sinus fractures does not always necessitate surgical intervention, especially in cases of minimally displaced anterior table fractures,[13] careful observation remains critical to

TABLE 4. Appropriate and Inappropriate Transfers Based on the FIG

Variables, n (%)	Overall (n = 511)	Appropriate Transfers (n = 252)	Inappropriate Transfers (n = 259)
Consultations of FTS	457 (89.5)	252 (100)	212 (82)
Discharged home without FTS consultation, admission, or intervention	54 (10.6)	0 (0)	54 (10.6)
Admission to floor*	137 (26.8)	137 (26.8)	0 (0)
Urgent operation	200 (39.2)	200 (39.2)	0 (0)
Admitted to FTS, intervention by FTS	109 (21.3)	109 (21.3)	0 (0)
Admission to other service,** intervention by FTS	91 (17.8)	91 (17.8)	0 (0)
Emergency operation	39 (7.6)	39 (7.6)	0 (0)
Consultation to FTS without intervention, discharged from ED	212 (41.5)	0 (0)	212 (41.5)
No FTS consult, discharged from ED	47 (9.2)	0 (0)	47 (9.2)
Time in ED, median (IQR), h	5.5 (3–8)	5 (3–8)	4 (3–8)
Outpatient intervention by FTS	26 (5.1)	0 (0)	26 (10)

*By any service, for either observation or subsequent surgical procedure.
**Ophthalmology, plastic surgery, ENT, or trauma surgery.
IQR, interquartile range.

prevent immediate and long-term complications.[10] Since all patients were admitted or underwent surgery during the same admission, these transfers were considered appropriate.

Orbital Fractures

Orbital injuries are often associated with midface trauma, and while orbital fractures can occur at any point along the orbital walls, our patient population primarily sustained orbital floor fractures. Orbital fractures are complex facial trauma cases, with up to 29% of patients presenting with associated ocular injuries or visual abnormalities.[14] In our population, 35% of patients who sustained orbital fractures had concomitant visual abnormalities. Decreased visual acuity and diplopia are key indicators for assessing prognosis in these cases[8] and were considered alarming signs for transfer. In addition, retrobulbar hemorrhage can induce orbital compartment syndrome by increasing intraocular pressure and compromising the optic nerve.[15] This ophthalmologic emergency requires immediate intervention, typically through lateral canthotomy or cantholysis, as was performed in all patients presenting with this sign at our facility, rendering these transfers appropriate. Additionally, comminuted orbital fractures, characterized by the fragmentation of the orbital wall into multiple pieces, are typically associated with high-impact injuries.[16] These fractures carry an increased risk of nerve or muscle entrapment and a greater likelihood of enophthalmos because of their extensive nature. Given the complexity of these injuries, consensus was reached that they require highly specialized care, and transfers were appropriate in all cases. The management of orbital fractures comprises observation followed by surgical intervention within 14 days if deemed necessary.[17] However, our panel agreed that initial stabilization with outpatient consultation may be safely indicated in simple and slightly or nondislocated orbital floor fractures without disturbance of sight/eye mobility or increase of intraocular pressure.

Zygomatic Arch, Nasal Bone, and Maxillary Sinus Fractures

Zygomatic arch and nasal bone fractures are the most common facial injuries;[18,19] however, they generally do not require inpatient management.[18–20] Minimal or nondisplaced fractures are generally managed in the outpatient setting, as followed in our hospital's practice. Urgent procedures, such as drainage of septal hematomas, can often be performed at the referring facility with follow-up, as it is included in the scope of emergency medicine.[21] Additionally, soft tissue edema often delays nasal fracture reduction until 3 to 7 days postinjury.[21,22] Similarly, isolated maxillary sinus fractures required no intervention by our FTS and were managed nonurgently, even when associated with alveolar fractures. Stabilization of the alveolar segment can safely be delayed beyond 24 hours without increased risk of necrosis or infection,[23–25] which applied to fewer than a quarter of our patients sustaining these injuries, all treated on an outpatient

TABLE 5. Insurance Information Among Transferred Patients Based on the FIG

Insurance Type, n (%)	Overall (n = 511)	Appropriate Transfers (n = 252)	Inappropriate Transfers (n = 259)	*p*
Medicaid	201 (39.3)	90 (35.7)	111 (46.7)	**0.041**
Medicare	100 (19.6)	46 (18.2)	55 (21.2)	0.068
Other government	28 (5.5)	10 (3)	18 (6.9)	0.118
Private/commercial insurance	110 (21.5)	63 (25)	47 (18.1)	**0.029**
Self-pay	44 (8.6)	25 (9.9)	19 (7.3)	**0.022**
Worker's compensation	11 (2.2)	7 (2.7)	4 (1.5)	0.280
Other	17 (3.3)	15 (5.9)	2 (0.7)	0.152

*Bolded values indicate a significant *p* value <0.005.

Facial Injury Guidelines

Type of Injury	Appropriate Transfer (%) *	Interpretation
Upper Facial Bones (n=9)		
Frontal Sinus Fracture	(9/9) 100%	Transfer
Middle Facial Bones (n=349)		
Orbital Fracture	(111/255) 43%	Transfer if Alarming Signs Exist
Decreased Visual Acuity/Diplopia	55/55 (100%)	
Restricted ocular motility	55/55 (100%)	
Retrobulbar Hemorrhage	12/12 (100%)	
Comminuted Fracture	20/20 (100%)	
Isolated Fracture with no Alarming Sign	0/156 (0%)	
Zygomatic Arch Fracture	0/49 (0%)	Do Not Transfer
Nasal Bone Fracture	0/111 (0%)	Do Not Transfer
Maxillary Sinus Fracture	0/81 (0%)	Do Not Transfer
Complex Fractures		
Zygomaticomaxillary Fracture	6/19 (30%)	Transfer if Alarming Signs Exist
Decreased Visual Acuity/ Diplopia	6/6 (100%)	
Naso-Orbito-Ethmoid Fracture	8/8 (100%)	Transfer
Decreased Visual Acuity/ Diplopia	2/2 (100%)	
Le Fort Fracture		
Type I	0/15 (0%)	Do Not Transfer
Type II	27/27 (100%)	Transfer
Type III	9/9 (100%)	Transfer
Lower Facial Bones (n=153)		
Hard Palate Fracture	0/9 (0%)	Do Not Transfer
Maxillary Alveolus Fracture	0/22 (0%)	Do Not Transfer
Mandible Fracture	20/146 (16%)	Transfer if Bilateral or Condyle Fracture
Mandibular Condyle Fracture	10/10 (100%)	
Bilateral mandibular Fracture	14/14 (100%)	
Soft Tissue Injury (n=178)		
>2cm of missing tissue	12/12 (100%)	Transfer
Neurologic signs and symptoms	10/10 (100%)	Transfer
Eyelid/Globe laceration	40/40 (100%)	Transfer

*The denominator is every patient that had that type of injury, and the numerator is the number of patients that had an appropriate transfer based on that specific injury.

Figure 1. Facial Injury Guidelines.

basis. Given the hospital course of patients who sustained the fractures, these transfers were considered as potentially unnecessary.

Maxillary Alveolar and Hard Palate Fractures

Maxillary alveolar fractures are usually associated with dental injuries, and in these cases, the goal of treatment focuses on the stabilization of the alveolar segment.[26] As mentioned previously, the delay of this stabilization does not exacerbate the outcomes;[25] hence, all patients who sustained this injury in our center were managed on an outpatient basis following the transfer. Furthermore, literature regarding hard palate injuries is limited as their incidence is infrequent.[27] Although these fractures are associated with malocclusion and wound complications,[28] none of our patient's received intervention before being discharged. Therefore, these injuries were considered inappropriate.

Complex Fractures

In most cases of zygomaticomaxillary fractures, surgery is not indicated unless there are emergent concerns.[29] This is consistent with our findings, where two thirds of transferred cases required neither intervention nor observation. However, because of their proximity to the orbital floor, these fractures can lead to extraocular muscle entrapment and necrosis.[30] Poorly managed orbitozygomatic injuries are common postfacial trauma issues;[29] therefore, consensus was reached that diplopia and decreased visual activity were alarming signs for these injuries and, when

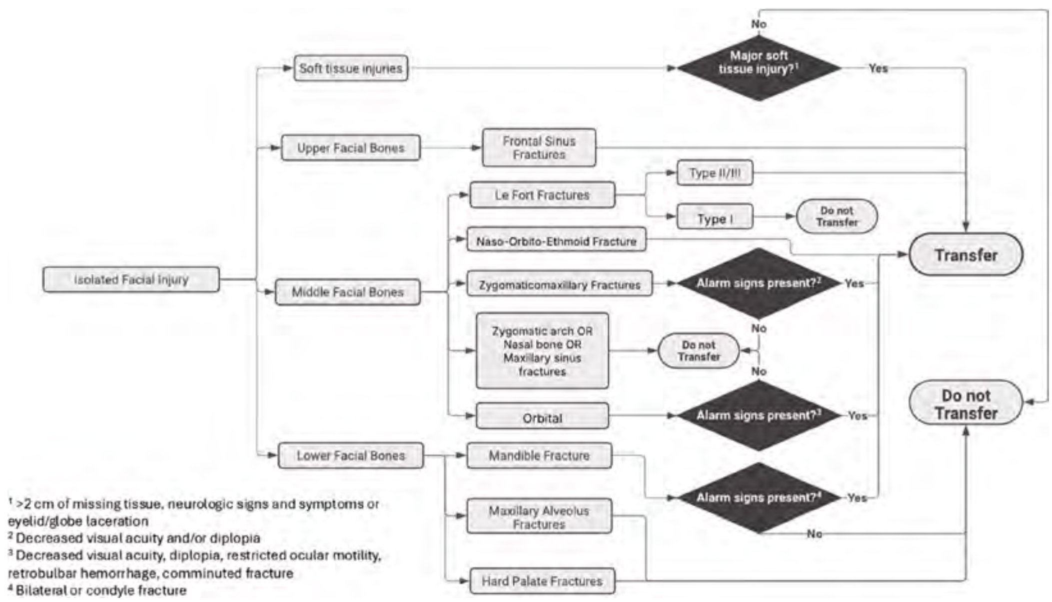

Figure 2. Facial Injury Guidelines decision algorithm.

present, require transfer. In our study, all six cases were monitored inpatient, and three of these required open reduction and fixation of the midface. They were therefore considered appropriate transfers. Naso-orbito-ethmoid fractures, often caused by high-energy trauma, are clinically significant because of their proximity to the medial canthal tendons and skull base structures.[31] These fractures can result in epiphora and cerebrospinal fluid (CSF) leakage, as seen in one of our patients, and pose risks to vascular structures and the skull base, potentially leading to retrobulbar hematoma and CSF leaks.[32] Given the severity and complexity of these injuries, all patients with naso-orbito-ethmoid fractures should be transferred to higher-level trauma centers for specialized management.

Le Fort Fractures

Le Fort fractures disrupt midface continuity and are classified into types I, II, and III based on fracture pattern.[33] Type II, described as the most common type,[34] accounted for over half of our cases. Within our patients, minimally displaced type I fractures did not require emergent treatment, with all receiving surgery in a later admission; hence, transfers were considered as potentially unnecessary. Types II and III injuries, by contrast, involve more extensive and complex trauma, with all affected patients in our study requiring urgent or emergent intervention with either maxillomandibular fixation or Le Fort repair. These injuries carry severe complications, including extraocular muscle damage, orbital hematoma, globe rupture, CSF leaks, the need for tracheostomy, and even death.[35,36] Because of their complexity and potential for complications, all Le Fort type II and III fractures should be referred to higher-level trauma centers for advanced management.

Mandibular Fractures

The literature presents conflicting evidence regarding the optimal timing for managing mandibular fractures. While some studies suggest that delayed management does not increase the risk of complications,[37] others emphasize that certain fractures require immobilization within 72 hours of injury to mitigate adverse outcomes.[38] Among the transferred cases, 20 patients underwent either bilateral mandibular open reduction and internal fixation or closed reduction with intermaxillary fixation for condylar fractures. Based on expert panel consensus, patients presenting with these specific features were classified as appropriate transfers.

Soft Tissue Injuries

Despite their high incidence, facial soft tissue injuries lack a widely accepted treatment algorithm.[39] In our population, one third of patients presented with soft tissue injuries, the majority of which were associated with concomitant bone fractures. Forehead injuries and flap defects exceeding 2 cm were uniformly managed by plastic surgery, using either direct defect re-approximation or free skin flaps. Regarding eyelid and globe lacerations, the literature emphasizes the importance of primary repair within the first 24 hours to mitigate the risk of endophthalmitis and choroidal hemorrhage.[40] Although less prevalent in our cohort, neurological signs indicative of facial or maxillary nerve injury, such as total loss of sensation, paresthesia, and facial muscle weakness, necessitated specialized consultation, in line with the existing literature.[41] Patients with these patterns of injury required expert consultation, urgent intervention, or admission for observation by the FTS or neurology service; therefore, these transfers were considered as appropriate.

While insurance status correlated with transfer appropriateness, our analysis found that surgical intervention decisions were based on clinical indications rather than payer type. Medicaid patients were more frequently discharged, but those who required surgery underwent intervention based on FIG criteria and objective clinical findings. Although we did not assess financial barriers to outpatient follow-up, prior research suggests that uninsured patients may face challenges in accessing elective surgical care postdischarge.[42,43] Future research should assess whether insurance status impacts postdischarge follow-up and access to outpatient surgical care.

Variability in facial trauma expertise among referring providers contributes to secondary overtriage, as many lack specialized training in facial fracture management. However, our objective is not to shift the responsibility of diagnosis and management to nontrauma physicians but rather to provide clear, evidence-based transfer guidelines to assist in decision making. Prior studies show that more than 80% of facial trauma specialists believe that structured transfer criteria could reduce unnecessary transfers,[44–47] supporting the need for a standardized framework. The FIG aim to fill this gap by improving triage decisions, reducing overutilization of trauma center resources, and ensuring timely care for patients who truly require higher-level intervention.

Given our findings, a significant proportion of facial trauma transfers do not require admission or intervention. As the only American College of Surgeons–verified Level I trauma center in Southern Arizona, our institution accepts all transfer requests under an open transfer policy. Currently, transfers are initiated at the discretion of referring providers, including emergency medicine physicians and other advanced practice providers, without mandatory pretransfer consultation with an FTS.

Our study is not without limitations. We excluded patient-initiated transfers for cosmetic reasons from our study to maintain a focus on cost-saving measures in trauma care, as some patients might seek specialized care for esthetic outcomes, which were beyond the scope of our guidelines. Additionally, a limitation of our study is the inability to analyze patients who were not transferred but should have been, as they never reached our facility. However, given our hospital's open transfer policy, the number of such cases is likely minimal. To address this limitation, future studies could incorporate or prospective validation of our guidelines to assess whether patients who were not transferred experienced adverse outcomes because of delayed or missed specialist evaluation. We also considered the inherent subjectivity of expert opinions used in developing our recommendations as a potential limitation. To mitigate this, we combined expert judgment with objective criteria, ensuring a more robust and reliable framework for guideline development. Additionally, the long-term impact of the proposed triage system on complications and outcomes, despite support from the literature, remains uncertain.

CONCLUSION

Applying these guidelines to inappropriate transfers could have potentially prevented 259 unnecessary transfers, ensuring that patients receive the appropriate level of care without overusing trauma center resources. This demonstrates the significant impact that evidence-based guidelines can have in optimizing resource allocation, reducing health care costs, and enhancing the efficiency of trauma care systems. Future studies should focus on validating these guidelines in broader populations and assessing their impact on patient outcomes and triage practices.

AUTHORSHIP

F.C.D., T.A. L.J.M., and B.J. designed this study. F.C.D., M.H.K., C.C., M.A.M., O.H., and B.J. searched the literature. F.C.D., M.A.M., O.H., C.C., A.K., T.A., and B.J. collected the data. F.C.D., M.H.K., L.J.M., M.D., and B.J. analyzed the data. All authors participated in data interpretation and manuscript preparation.

DISCLOSURE

Conflicts of Interest: Author Disclosure forms have been supplied and are provided as Supplemental Digital Content (http://links.lww.com/TA/E455).

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